



RECORDS FOR THE UTILIZATION OF *PRUNUS* AS A LARVAL FOODPLANT BY 71 SPECIES OF LEPIDOPTERA IN NORTHEAST CALIFORNIA

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ABSTRACT. Twenty-six sites in five northeastern California counties (Shasta, Modoc, Plumas, Lassen, Tehama) were surveyed from 1991 - 1999 for the presence of lepidopteran larvae on naturally occurring shrubs of the genus *Prunus*. To date, a total of seventy-one species of Lepidoptera from seventeen families have been documented to utilize one or more of the area's three *Prunus* species (*P. emarginata*, *P. subcordata*, and *P. virginiana* var. *demissa*).

Additional key words. Host plant, rearing, beating method.

INTRODUCTION

There are numerous articles in the lepidopterous literature that discuss the utilization of various larval foodplants by a specific family, genus, or species of butterfly or moth. However, little has been published where the focus is on a specific genus or species of plant to determine the extent of its generalized lepidopterous utilization. We have undertaken such a study and here publish its results¹.

We selected the genus *Prunus* L. (Rosaceae) because 1) it is widely distributed in our study area of northeastern California and 2) was suspected to be used by a significant number of species. It is also often found growing in thickets, which increases the likelihood that the larvae found on it actually use it as a foodplant in nature. We selected a five county region in northeastern California for our study area. These counties are: Shasta, Modoc, Lassen, Plumas, and Tehama.

In this northeastern California region *Prunus* is represented by three native species of deciduous shrubs or small trees – *P. emarginata* (Hook) Walp, *P. virginiana* L. var. *demissa* (Nutt) Torrey, *P. subcordata* Beuth. These plants grow under a wide range of conditions in this diverse area where the Cascades merge with the Sierras, the Modoc Plateau, and Great Basin. A fourth species, *P. andersonii* Gray, also occurs in northeastern California but is restricted to a small, unique area of Lassen County and was not included in this study.

¹ Editor's note: Host association is an important taxonomic indicator, both specifically and subspecifically. This is because a shift in host preference (which often offers a habitat shift opportunity) is a precursor to more significant evolutionary shifts. At *TTR* we feel that documenting the larval hosts of today will greatly help in constructing the taxonomy of tomorrow.

PROFILE OF STUDY AREA *PRUNUS* SPECIES

The *Prunus* in this study were determined to species by the senior author by examining their branch characteristics, leaves, flowers, and fruits as they progressed through the stages of their seasonal cycle.

Prunus emarginata (Bitter Cherry) is a 4-12 foot shrub with high slim, flexible branches. Its flowers are white and form rounded clusters of 3-12. The leaves are 0.75 to 2.00 inches long, oblong, and have finely toothed margins. Its fruit is oval, 0.50 inches in diameter, and turns from red to black when ripe. It inhabits mountain ridges, moist slopes, and stream banks from 500 to 9,000 feet in the southern California mountains, Coast Ranges, and Sierra Nevada. It often forms large thickets on damp slopes and in canyons.

Prunus virginiana var. *demissa* (Western Chokecherry) is usually found in the form of a shrub 3-12 feet high with flexible branches, but occasionally becomes a small tree reaching up to 20 feet high. The white flowers form racemes, making Chokecherry easy to distinguish from the other area *Prunus* species. The leaf-blades are oval, 1.5 to 3.5 inches long, and finely serrate on the margins. The fruits are round, 0.25 to 0.5 inches in diameter, and turn from red to dark purple when mature. It occupies moist sites in the mountains throughout California, northward to British Columbia, and eastward to Nevada and Arizona. It is often found with *P. emarginata*.

Prunus subcordata (Sierra or Klamath Plum) is a shrub or small tree 6-20 feet tall with stiff, short, thorn-like, crooked branches. Its leaves are ovate, 0.75 to 2.0 inches long, and usually heart shaped at their base. Its flowers are white or pink in clusters of 2-4. The fruits are oblong, 0.75 to 1.0 inches in length, and become bright red or yellow when mature. This *Prunus* inhabits moist or dry foothill rocky slopes in middle elevations of the Sierra Nevadas north into southern Oregon. It is often found with *P. virginiana* and occasionally *P. emarginata*.

TABLE 1. Sites & *Prunus* present: *P. emarginata* (PREM), *P. virginiana* var. *demissa* (PRVI), *P. subcordata* (PRSU).

NO.	LOCALITY	PREM	PRVI	PRSU
1.	Shasta Co., Hwy. 299, 3 mi. NE Burney, 3000 ft.			X
2.	Modoc Co., Hwy. 299, 7 mi. E of Hwy. 395, 5460 ft.			X
3.	Modoc Co., 1 mi. W of Lake City, 4700 ft.			X
4.	Modoc Co., Hwy. 299, Cedar Pass, 6300 ft.	X	X	X
5.	Modoc Co., Hwy. 299, 2 mi. W Cedarville, 5250 ft.	X	X	X
6.	Modoc Co., 2 mi. E New Pine Creek, 5250 ft.			X
7.	Modoc Co., Hwy. 395, 6 mi. N Davis Creek, 5250 ft.	X		X
8.	Modoc Co., For. Rd. 9, Fandango Pass, 6300 ft.	X		X
9.	Modoc Co., 3 mi. SE Davis Crk, Plum Valley Cp., 5790 ft.	X		
10.	Modoc Co., Soup Springs Camp Ground, 6900 ft.	X		
11.	Modoc Co., 10 mi. E Likely, Jess Valley, 5000 ft.			X
12.	Modoc Co., For. Rd. 5, N Fork Pine Creek, 6400 ft.	X		
13.	Modoc Co., 3 mi. NW Canby, Howard Gulch, 4350 ft.			X
14.	Plumas Co., Hwy. 36, 3 mi. E Chester, 4600 ft.	X		
15.	Plumas Co., Butt Valley Reservoir, 4200 ft.	X	X	
16.	Plumas Co., Black Mtn. Springs, 6 mi. SE Milford, 6050 ft.		X	
17.	Plumas Co., Humbug Creek, 4 mi. NW Portola, 5500 ft.		X	
18.	Lassen Co., Susan R, 1 mi. W Susanville, 4200 ft.	X	X	
19.	Lassen Co., Observ. Peak, Lookout Road, 6400 ft.	X	X	
20.	Lassen Co., Bkhrn. Cow Camp, 22 mi. NE Rvndl., 6200 ft.		X	
21.	Lassen Co., Eagle Lake at Rocky Point, 5200 ft.		X	X
22.	Lassen Co., Hwy. 139, 3 mi. S of Co. Rd. A-1, 5200 ft.		X	
23.	Lassen Co., Shinn Mtn., 6700 ft.	X	X	
24.	Lassen Co., Hwy. 395 at Secret Creek, 4600 ft.		X	
25.	Lassen Co., Ash Valley Rd., 10 mi. W Madeline, 5250 ft.		X	
26.	Tehama Co., Deer Crk., Hwy. 32, 3300 ft.			X

COLLECTION OF IMMATURES AND RESULTS

Methods

The best way to determine the number of lepidopterous species utilizing *Prunus* is to collect eggs, larvae, and pupae directly from wild plants and rear them to adults. All other methods are greatly inferior (e.g. trying to observe oviposition by wild females).

The best technique for gathering immatures is the long employed, but simple, method called "beating." Beating is simply the act of suddenly jarring a branch so that resting larvae are loosed from their grip on the plant and then fall harmlessly onto a light colored cloth beneath the branch. The immatures are then gathered into rearing containers where they complete their metamorphosis. Beating does little immediate damage to these shrubs/trees and inflicts no long term harm to them.

From 1991 through 1999 the senior author made many field trips into the northeastern California study area to gather immature Lepidoptera from indigenous *Prunus*. Twenty-six separate locations were established and surveyed for immatures in the five county study area (Table 1). These sites were widely dispersed to provide the maximum amount of species. Although there was no sampling design, efforts were made to collect all sites at various times of the year. The vast majority of gathered specimens were larvae in all stages of development. Occasionally, pupae were also obtained.

Specimens were usually collected mid-morning and mid-afternoon. After a brief visual search for larvae, the branches of the foodplant were struck with a stick and the larvae were collected from a canvas sheet being held under the branch. The larvae were then reared on the same species of *Prunus* from which they were gathered in small plastic containers or in glass lamp chimneys until pupation. Most of the larvae were photographed.

Results

This nine year study has shown that the three *Prunus* species growing in northeastern California are utilized as food plants by a large and diverse assemblage of Lepidoptera. Seventy-one species representing seventeen lepidopteran families (Table 2) were collected from and reared to adults on these native *Prunus*. One hundred and nineteen foodplant records were documented by this project. Most of these were new food plant records. Sixty-six of the specimens represent new county records for northeastern California.

Approximately half of the Lepidoptera recorded in this study utilized more than one species of *Prunus*. Thirty-six of the 71 species (51%) were recorded on two or more species of *Prunus*. Ten of these were recorded on all three of the *Prunus* hosts studied.

Thirty-three of the 71 species (46%) were recorded on only one *Prunus* hostplant. These host specific species were divided almost equally between the three species of *Prunus*, indicating that none of the hostplants were more (or less) important as a larval substrate. Eight species (23%) were found only on *P. emarginata*, thirteen species (38%) were found only on *P. virginiana*, and fourteen species (40%) occurred only on *P. subcordata*.

As a way to evaluate the completeness of this study, published hostplant information for three of the best studied families of Lepidoptera (Papilionidae, Lycaenidae, and Nymphalidae) was compared to our results. Six species from these families are known to utilize *Prunus* as a larval host. We found five of these during random collecting for this study and reared them to adults. The larvae of *Satyrium titus occidentalis* (Austin & Emmel, 1998), an uncommon butterfly also known to feed on *Prunus*, was not recorded. However, *Deciduphagus augustinus iroides* (Boisduval, 1852) was discovered feeding on both *P. emarginata* and *P. subcordata* which were previously unrecorded hostplants for this taxon.

This evaluation method suggests that this study recorded most of the common Lepidoptera utilizing *Prunus* as a larval hostplant. Collecting larvae at night, at additional locations, and with improved rearing techniques would undoubtedly result in several additions to these records from the study area. The 230 reared adults are deposited in the Essig Museum of Entomology, University of California, Berkeley.

TABLE 2. *Prunus* host(s) utilized by Lepidoptera species. *Prunus* abbreviations and location numbers from Table 1.

FAMILY/SPECIES	PREM	PRVI	PRSU	LOCALITIES
COLEOPHORIDAE				
1. <i>Coleophora irroratella</i> Wlsm.	X			14
GELECHIIDAE				
2. <i>Chionodes thoraceochrella</i> Cham.		X		22
3. <i>Filatima dimissae</i> Keif.		X	X	4, 5, 15, 19, 20, 23
PLUTELLIDAE				
4. <i>Ypsolopha walsinghiamiella</i> Busck	X	X		14, 15, 19
TORTRICIDAE				
5. <i>Phaneta columbiana</i> Wlsm.	X			8
6. <i>Epinotia albicapitana</i> Kft.		X		23, 25
7. <i>lomonana</i> Kft.		X		25
8. <i>Acleris hastiana</i> L.		X	X	5, 22
9. <i>senescens</i> Zell.	X	X	X	4, 19, 25
10. <i>paracinderella</i> Powell			X	11
11. <i>aenigmata</i> Powell		X		16
12. <i>maximana</i> B. & Bsk.	X			14
13. <i>Choristoneura rosaceana</i> Harris		X	X	5, 21
14. <i>Archips argyrospila</i> Wlk.	X	X	X	9, 15, 21, 22, 24
15. <i>cerasivorana</i> Fitch		X		23
16. <i>Sparganothis senecionana</i> Wlsm.			X	1, 5
PAPILIONIDAE				
17. <i>Papilio multicaudatus pusillus</i> Austin & J. Emmel		X		5
18. <i>eurymedon</i> Lucas		X		15
LYCAENIDAE				
19. <i>Satyrium californicum</i> Edwards			X	5, 21
20. <i>Deciduphagus augustinus iroides</i> Bdv.	X		X	9, 14, 15
21. <i>Celastrina ladon echo</i> Edwards		X		5, 15
NYMPHALIDAE				
22. <i>Limenitis lorquini lorquini</i> Bdv.		X	X	5, 25
PYRALIDAE				
23. <i>Acrobasis tricolorella</i> Godart			X	21
24. <i>Ambesa walsinghiami mirabella</i> Dyar	X		X	5, 14, 15, 19, 21
PTEROPHORIDAE				
25. <i>Oidaematophorus occidentalis</i> Wlsm.			X	7
GEOMETRIDAE				
26. <i>Itame umbriferata</i> Hulst	X	X		14, 15, 23
27. <i>Dasyfidonia avuncularia</i> Gn.	X		X	10, 21
28. <i>Hesperumia sulphuraria</i> Pack.	X	X	X	13, 14, 18, 19, 25, 26
29. <i>fumosaria impensa</i> Rindge	X	X	X	1, 4, 8, 15, 18, 25, 26
30. <i>latipennis</i> Hulst	X			14
31. <i>Anacamptodes clivinaria</i> Gn.		X	X	4
32. <i>fragilaria</i> Grossb.	X			4
33. <i>Iridopsis emasculata</i> Dyar	X	X		4
34. <i>Biston betularia cognataria</i> Gn.	X			14
35. <i>Erannis tiliaria vancouverensis</i> Hulst			X	1, 7, 26
36. <i>Sericosema wilson.macdunnoughi</i> Rindge			X	26

FAMILY/SPECIES	PREM	PRVI	PRSU	LOCALITIES
37. <i>Pero occidentalis packardi</i> C. & S.	X	X	X	2, 4, 5, 14, 15, 19
38. <i>Nacophora perfidaria</i> B. & McD.			X	2
39. <i>Sicya macularia</i> Harris	X		X	4, 14, 15
40. <i>Synaxis cervinaria</i> Pack	X	X	X	2, 4, 7, 14, 15
41. <i>barnesii</i> Hulst	X		X	19, 21
42. <i>hirsutaria</i> B. & McD.	X		X	7
43. <i>Nematocampa brehmeata</i> Grossb.	X	X	X	1, 4, 7, 25, 26
44. <i>Eupithecia maestosa</i> Hulst	X	X	X	14, 15, 26
45. <i>misturata</i> Hulst	X	X		9, 14, 18, 25
46. <i>nevadata</i> Pack.			X	5, 21
LASIOCAMPIDAE				
47. <i>Phyllodesma coturnix</i> Lajon.	X	X	X	4, 12, 14
48. <i>Malacosoma californicum</i> Pack.	X		X	5, 14
SATURNIIDAE				
49. <i>Hemileuca eglanterina</i> Bdv.	X	X		4, 14, 24
50. <i>Hyalophora euryalus</i> Bdv.	X	X		14, 24
SPHINGIDAE				
51. <i>Sphinx drupiferarum</i> J.E. Smith	X	X		4, 5
52. <i>Paonias myops</i> J.E. Smith		X		15
NOTODONTIDAE				
53. <i>Schizura unicornis conspecta</i> Hy. Edw.		X	X	5, 25
ARCTIIDAE				
54. <i>Leptarctia californiae</i> Wlk.			X	1
55. <i>Lophocampa maculata</i> Harris		X	X	4
LYMANTRIIDAE				
56. <i>Orgyia cana</i> Hy. Edw.			X	1
NOCTUIDAE				
57. <i>Drasteria adumbrata</i> Behr	X		X	5, 14, 18
58. <i>stretchii</i> Behr			X	4
59. <i>Acronicta mansueta</i> Smith			X	5, 21
60. <i>Aseptis binotata curvata</i> Grt.	X	X	X	5, 14, 15
61. <i>Andropolia theodori epichysis</i> Grote	X			14
62. <i>Xylena cineritia mertena</i> Smith		X		17
63. <i>Lithophane pertorrída</i> McD.		X	X	21
64. <i>georgii</i> Grote	X		X	14, 19, 21
65. <i>Eupsilia tristigmata</i> Grote		X		15
66. <i>Fishia evelina</i> French		X	X	5, 17
67. <i>Platypolia loda</i> Strecker		X		17
68. <i>Oncocnemis bakeri</i> Dyar			X	21
69. <i>Egira hiemalis</i> Grote		X	X	25, 26
70. <i>crucialis</i> Harvey	X	X		5, 14
71. <i>curialis</i> Grote		X	X	5, 21

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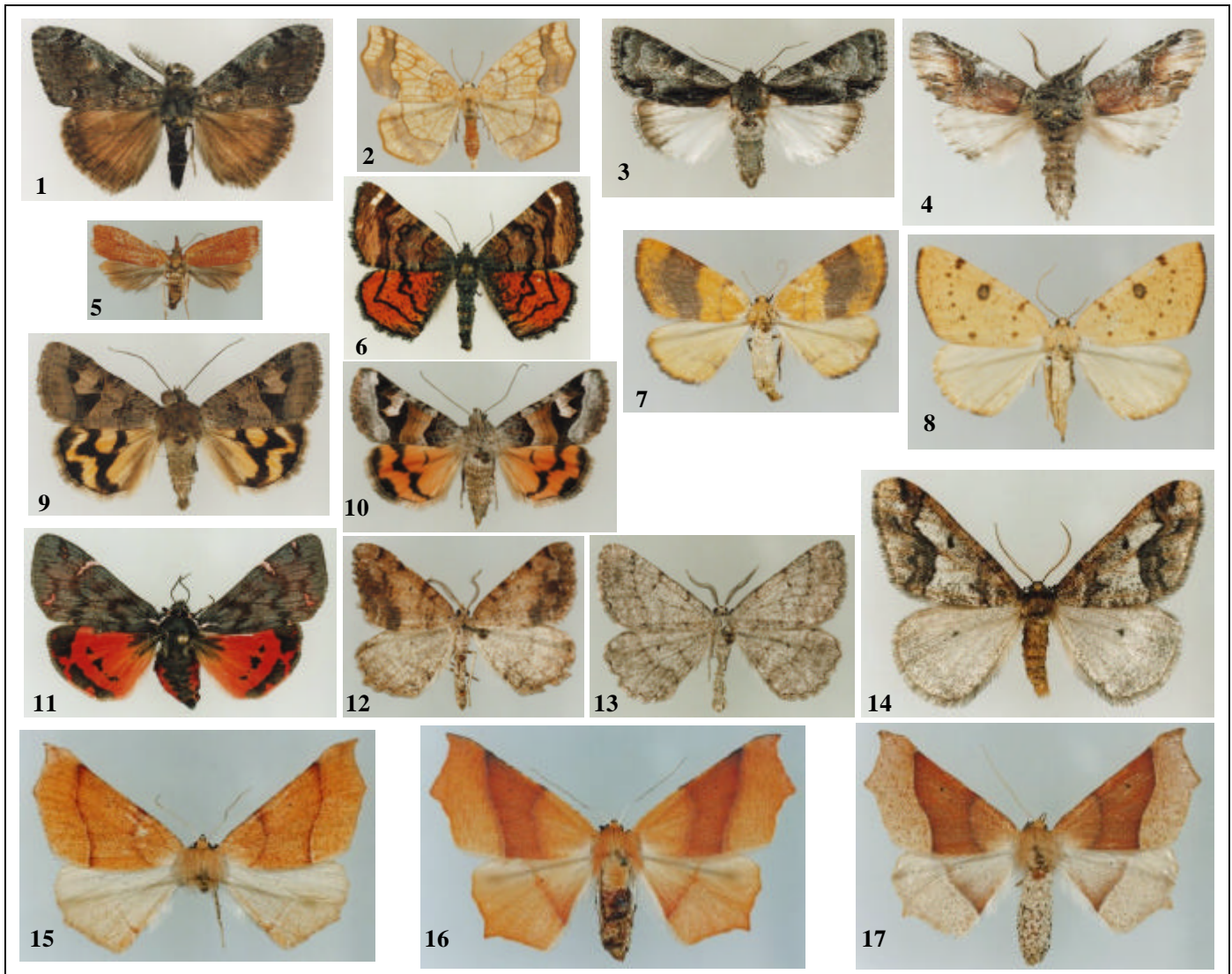
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Figures 1-17. Sample of study area species. Site numbers from table one. **Fig. 1.** *Orgyia cana*, site 1. **Fig. 2.** *Nematocampa brehmeata*, site 25. **Fig. 3.** *Acronicta mansueta*, site 5. **Fig. 4.** *Schizura unicornis conspecta*, site 25. **Fig. 5.** *Sparganothis senecionana*, site 5. **Fig. 6.** *Dasyfidonia avuncularia*, site 10. **Fig. 7.** *Hesperumia fumosaria impensa*, site 25. **Fig. 8.** *Hesperumia sulphuraria*, site 26. **Fig. 9.** *Drasteria adumbrata*, site 14. **Fig. 10.** *Drasteria strechii*, site 4. **Fig. 11.** *Leptarctia californiae*, site 1. **Fig. 12.** *Itame umbriferata*, site 15. **Fig. 13.** *Hesperumia latipennis*, site 14. **Figs. 14.** *Erannis tiliaria vancouverensis*, site 7. **Fig. 15.** *Synaxis hirsutaria*, site 5. **Fig. 16.** *Synaxis cervinaria*, site 4. **Fig. 17.** *Synaxis barnesii*, site 21. All photos by L. Crabtree. Specimens enlarged to 1.20 natural size.

Editor's note. A reviewer offered these comments: The beating method of collecting misses about half of the Lepidoptera fauna. The few micro's listed in this paper are mainly external feeders (and leaf-rollers), which do sometimes come out on beating, but all the leaf-miners, of which there will be lots, and stem borers, are completely missed by the beating method. Some of the Leps listed have never had their host plants recorded before, some are known already but are restricted to *Prunus* (and often *Salix* also) and others feed on almost anything. Some type of code as to which are new, restricted, and general feeders would be useful in this type of paper. The paper's OK as is...it does have good info in it!

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